OIPE JC71
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PATENT & TRADEMARK OFFICE

Figure 1

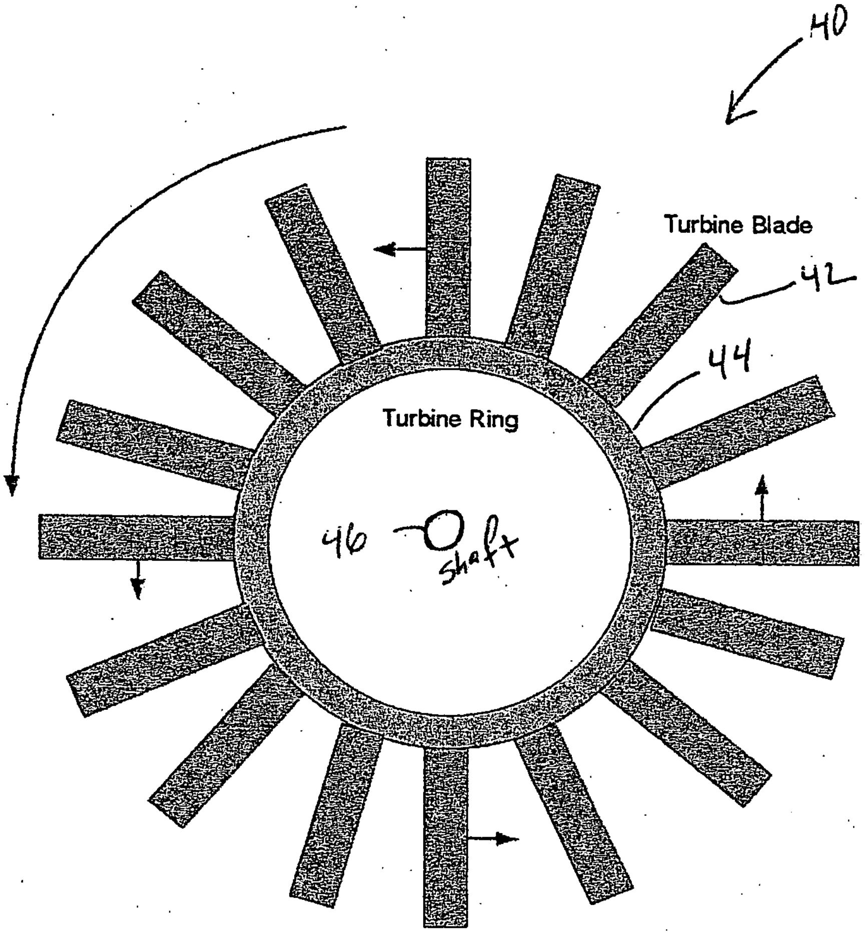
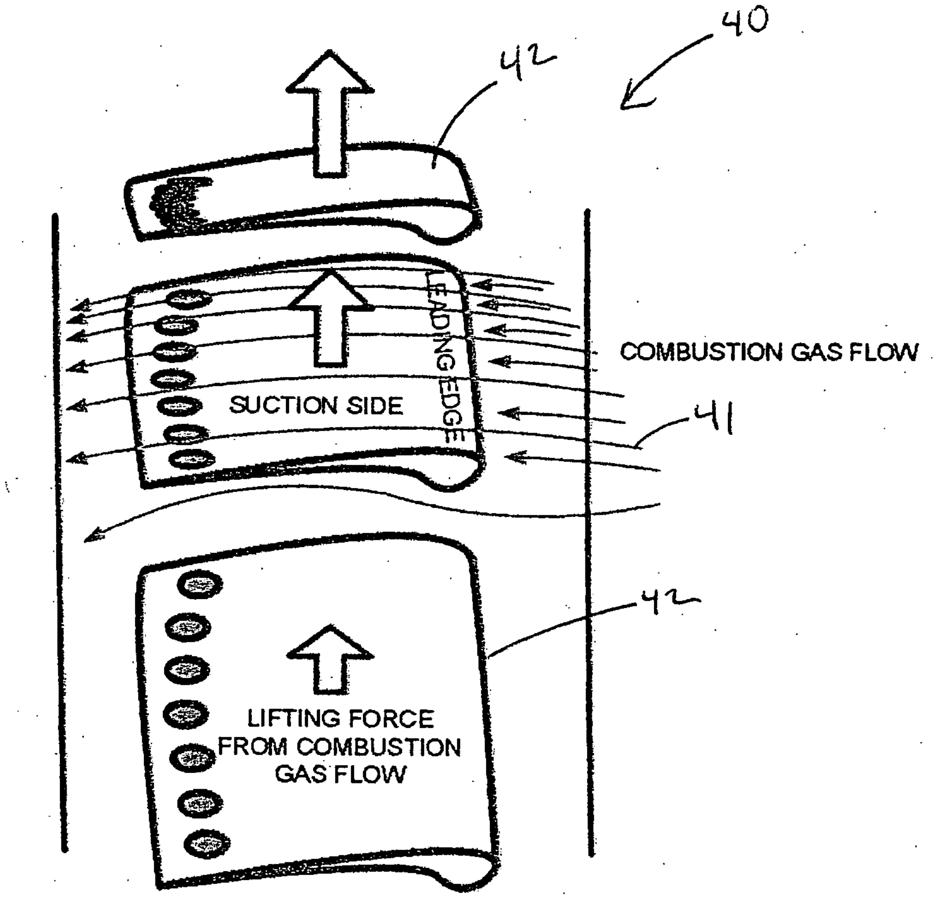


FIGURE 2



TURBINE RING

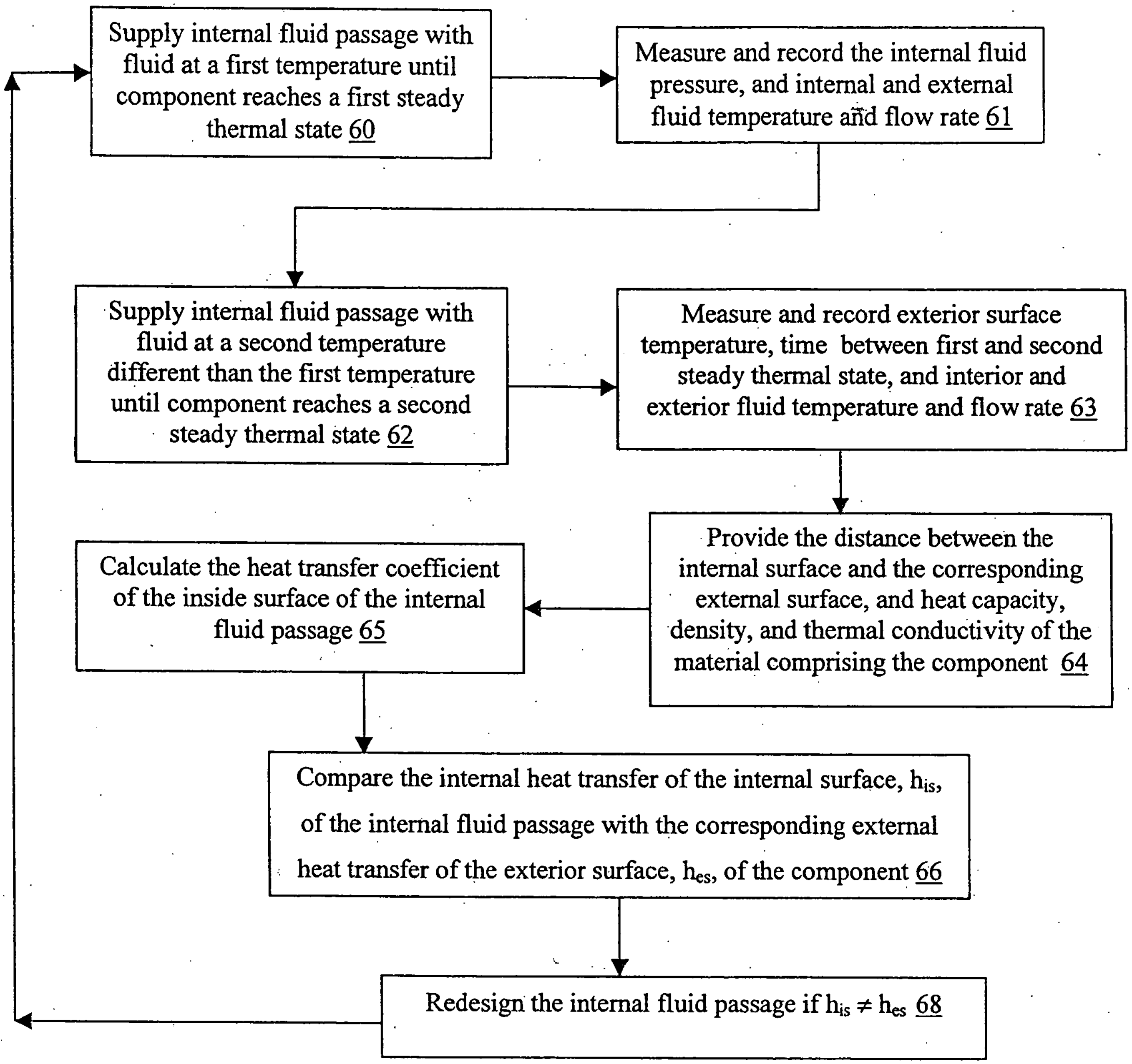

Supply internal fluid passage with fluid at a first temperature until component reaches a first steady thermal state 60
Measure and record the internal fluid pressure, and internal and external fluid temperature and flow rate 61
Supply internal fluid passage with fluid at a second temperature different than the first temperature until component reaches a second steady thermal state 62
Measure and record exterior surface temperature, time between first and second steady thermal state, and interior and exterior fluid temperature and flow rate 63
Provide the distance between the internal surface and the corresponding external surface, and heat capacity, density, and thermal conductivity of the material comprising the component 64
Calculate the heat transfer coefficient of the inside surface of the internal fluid passage 65
Compare the internal heat transfer of the internal surface, h_{is}, of the internal fluid passage with the corresponding external heat transfer of the exterior surface, h_{es}, of the component 66
Redesign the internal fluid passage if $h_{is} \neq h_{es}$ 68

FIG. 3

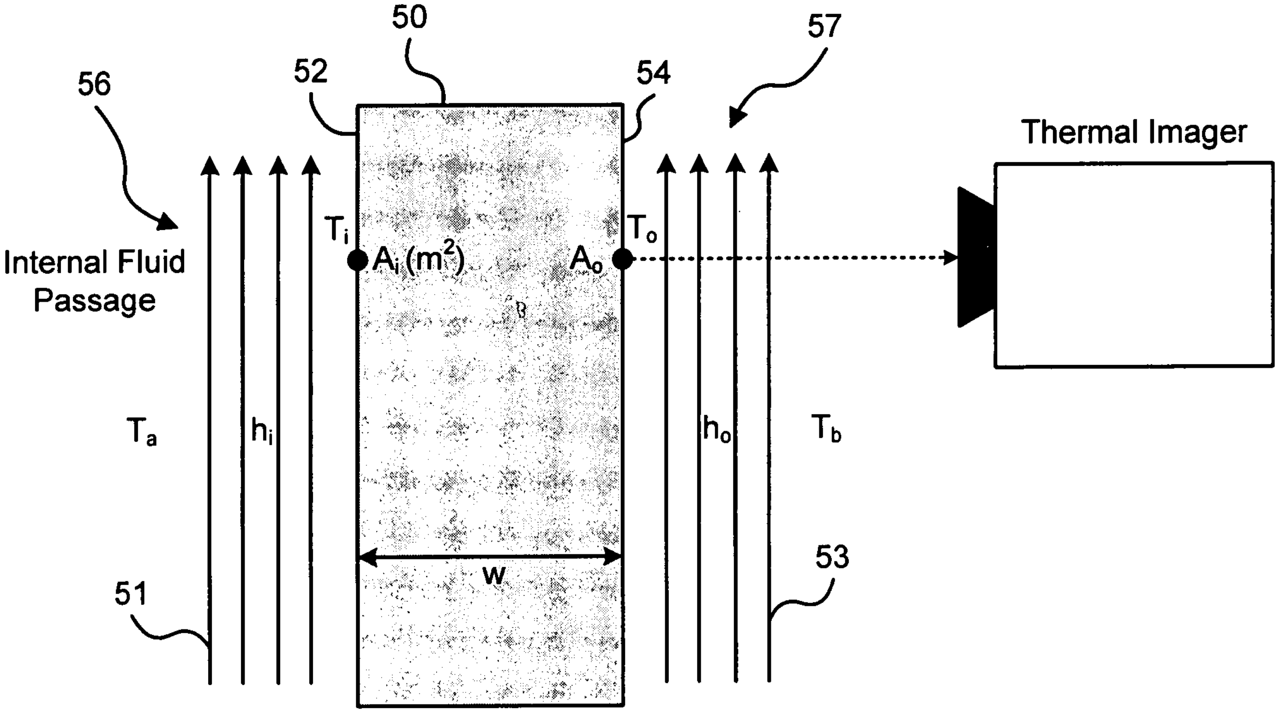

50
57
52
54
56
Thermal Imager
Internal Fluid Passage
T_i
T_o
$A_i(m^2)$
A_o
T_a
h_i
h_o
T_b
w
53
51

Figure 4

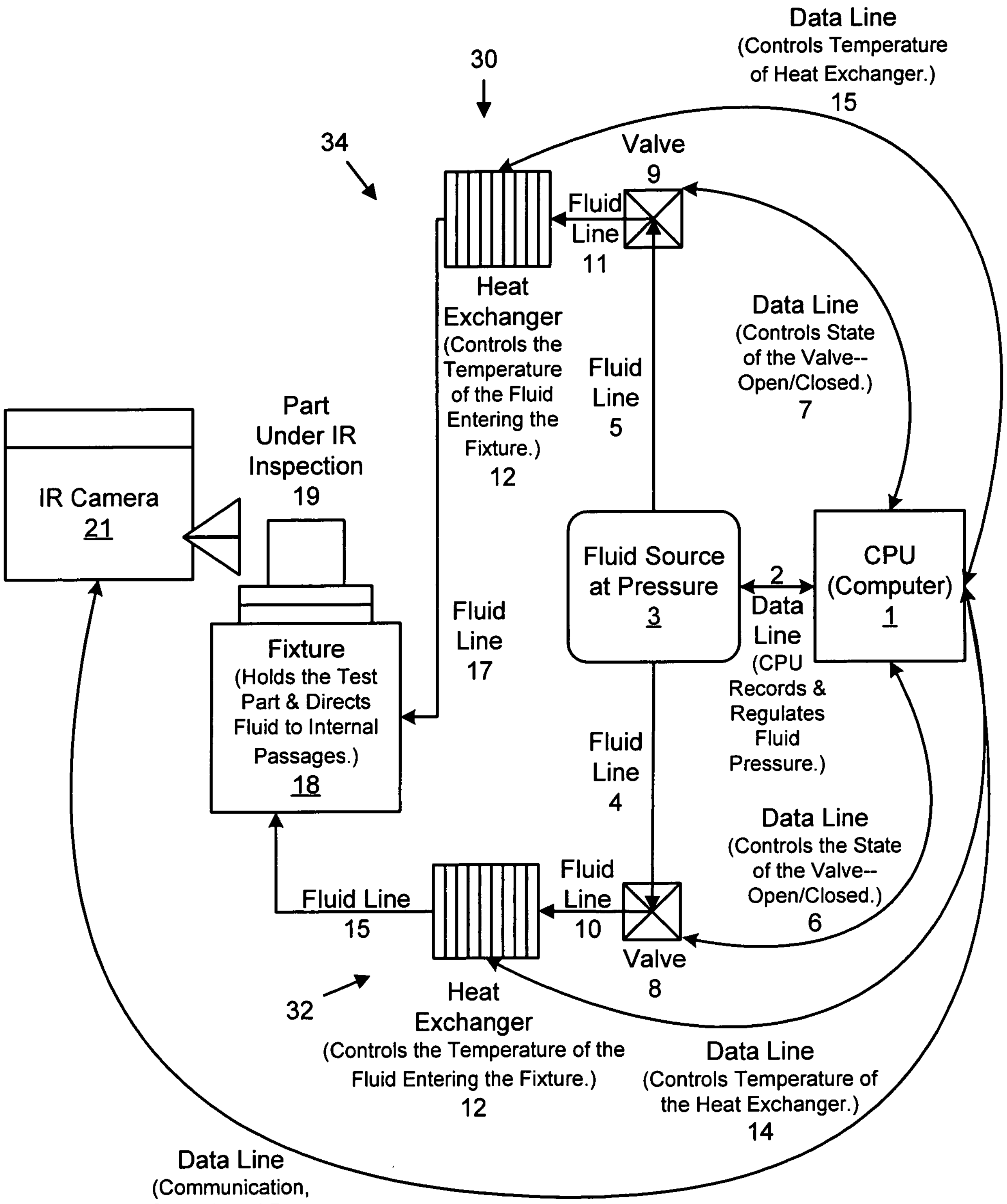

Data Line
(Controls Temperature of Heat Exchanger.)
15
30
34
Valve
9
Fluid Line
11
Heat Exchanger
(Controls the Temperature of the Fluid Entering the Fixture.)
12
Data Line
(Controls State of the Valve--Open/Closed.)
7
Fluid Line
5
Part Under IR Inspection
19
IR Camera
21
Fluid Source at Pressure
3
2
Data Line
(CPU Records & Regulates Fluid Pressure.)
CPU (Computer)
1
Fixture
(Holds the Test Part & Directs Fluid to Internal Passages.)
18
Fluid Line
17
Fluid Line
4
Data Line
(Controls the State of the Valve--Open/Closed.)
6
Fluid Line
15
Fluid Line
10
Valve
8
32
Heat Exchanger
(Controls the Temperature of the Fluid Entering the Fixture.)
12
Data Line
(Controls Temperature of the Heat Exchanger.)
14
Data Line
(Communication, Control, and Data Collection to/from the IR Camera.)
20

Figure 5